

PROJECT REPORT ASE PROJECT #213002

DATE: MARCH 4, 2013

SUBMITTED BY

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Survey Report-

American Surveying & Engineering was contracted to provide bathymetric data detailing the existing conditions of the that part of the Chicago River lying on the North-Easterly side of Goose Island, from the North face of the Division Street Bridge South-Easterly along the river approximately 1800'.

Hydrographic Survey work on the Chicago River was performed using ASE's Survey Vessel the Abraham Lincoln, a 22' custom aluminum boat built by Scully's Boats. The survey was performed on January 30th, 2013 and utilized a Reson Seabat 7125 High Resolution Multi-beam Echosounder (MBE) and Edgetech's 4125 Side Scan Sonar (SSS) system. The Seabat 7125 is a single and/or dual frequency (200/400 kHz for a range of 500m/200m respectively) multi-beam echosounder system. The Edgetech 4125 Side Scan Sonar system utilizes 400 kHz/900 kHz simultaneous dual frequency full spectrum CHIRP technology and is equipped with on-board sensors which detect roll, pitch, heading and depth. It has a maximum range of 150 meters at 400 kHz and 75 meters at 900 kHz. Both the MBE and SSS sensors were mounted to a fixed side mount which is referenced to the center of gravity of the vessel and the water surface. Because site conditions were not optimal for using RTK GPS for data collection (specifically for MBE and SSS work), positions were provided using Differential GPS. Differential GPS utilizes dual mounted Trimble SPS852 receivers and an internal gyro which detects roll, pitch, and heading. River bottom elevations were determined depth measurements from the surface. This method of data collection works well in areas with bridges or other overhead obstructions which impair GPS signals. RTK GPS and differential leveling were used to establish and verify existing and new control points and benchmarks. Recovery forms were completed for two new site benchmarks on this project.

Survey lines were run along the river and spaced approximately eight feet apart for both MBE and SSS collection. This allowed for full coverage of the river bottom and provided significant overlapping areas. The areas of overlapping data were later compared against each other during post processing as an additional vertical check on the data collected. Comparison of overlapping data was used instead of a bar check due to the inability to maintain real-time GPS initialization.

For QA/QC purposes "pole check" shots were taken on the river bed using a Trimble R8 GPS receiver mounted on an extended rod using correction data provided by the Trimble VRSNow network. The rod was lowered from the front of the boat until resistance was met. Between check shots, when removing the rod from the river, it was noticed that the bottom consisted of a soft silt material. Though care was taken to set the bottom of the rod at the exact river bottom, it was observed that that the rod had sunk into the layer of soft silt as much as 1.5 feet. This was based on the amount of visible silt on the bottom of the rod in-between shots. This was then confirmed during post processing when the check shots were compared to the dtm produced from the MBE work. The resulting differences ranged between 0.116' and 1.204' vertically (check shots were lower in elevation than the dtm) which are in line with what field crews were

seeing in the field. Shots were also taken on the top of water throughout the project limits and found the average elevation of the river during the work to be at 575.79'.

Control Recovery Forms-

USACE Survey Marker Archi	<u>ve & Retrieval Tool Datash</u>	eet Type: New
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State: Illinois		1
County: COOK	DISK	
District: Chicago	-E9 -E	The state of
Nearest Town: CHICAGO	The state of the s	E RE LEAN
USGS Quad: LOOP		
T.R.S.: T39N R14E S4		Park Target
Nearest Hwy/Mi: I-90/I-94, 1.1 MILE	Today Company	10
Date Recovered: 01/30/2013	- Horizontal -	- Vertical -
By: AMERICAN SURVEYING & ENGINEER	Datum: NAD83 (2011)	Datum: NAVD88 ()
Condition/Stability: Good B	Lat: 41°54'01.3531" N	Elevation Ht: 586.867
Setting/Monument Type: BRASS DISK	Lon: -087°38'46.1393" W	Ellip Ht:
Owner: ACOE	Local Accuracy: 2-cm	Local Accuracy: 2-cm
GPS Suitable: Yes No	NSRS Accuracy: 2-cm	NSRS Accuracy: 2-cm
Obstructions: N E S W	Survey/Computation Method:	Survey/Computation Method:
Magnetic: Yes No	Date Observed: 01/30/2013	Geodetic Levels Date Observed: 01/30/2013 Geoid09
Access:	- Tidal/Hydraulic Owner: Gage ID: - El	Gage Relationships - evation Datum - Epoch:
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- Horizon/Setup View -		- Close-Up View-
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Required Fields In Red		System Fields in Green

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U-SMART ver 5.0 23 AUG 2012

scription/Comments (Continued:							
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USACE Survey Marker Archiv	ve & Retrieval Tool Dat	tasheet Type: New
Designation: BM/HS-AME-204-CHI Project: 213002 NRT CHICAGO RIVER Stamping: BM/HS-AME-204-CHI CDO 1985 PID NGS: NA COE: State: Illinois County: COOK District: Chicago Nearest Town: CHICAGO USGS Quad: LOOP T.R.S.: T39N R14E S4 Nearest Hwy/Mi: I-90/I-94, 1 MILE	NHASTOS	DISK
Date Recovered: 01/30/2013	- Horizontal -	- Vertical -
By: AMERICAN SURVEYING & ENGINEER !!	Datum: NAD83 (2011) Datum: NAVD88 ()
Condition/Stability: Good B	Lat: 41°53'59.7825" N	Elevation Ht: 590.81 Ft
Setting/Monument Type: BRASS DISK	Lon: -087°38'46.8867" W	Ellip Ht:
Owner: ACOE	Local Accuracy: 2-cm	Local Accuracy: 2-cm
GPS Suitable: Yes No	NSRS Accuracy: 2-cm	NSRS Accuracy: 2-cm
Obstructions: N E S W	Survey/Computation Method: RTK	Survey/Computation Method: Geodetic Levels
Magnetic: Yes No	Date Observed: 01/30/2013	Date Observed: 01/30/2013 Geoid09
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The state of the s		- Elevation - Datum - Epoch: SEA WALL ON THE SOUTH-WESTERLY SIDE OF THE AND DIVISION ST HEAD SOUTH ALONG HALSTED
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Second-order, class II horizontal survey (that is to say, 1:20,000)

with average length line of 12,000 feet: $12,000 \times 1/20,000 = 0.600$ feet Second-order, class II leveling survey (that is to say, 8 millimeters per square-root of the distance in kilometers) with an average bench mark spacing of 1 mile (that is to say, 1.6 kilometers): $0.008 \times SQRT$ [1.6] = 0.01 meters

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Network accuracy for horizontal geodetic control points can be estimated in two ways.

First, if the NAD 83 coordinates are consistent with the original NAD 83 adjustment, for example, the original NAD 83 (1986), then the network accuracy has been determined to seldom exceed 1.0 meters. Second, if the NAD 83 coordinates are the result of a statewide or regional High Accuracy Reference Network (HARN) adjustment, then the network accuracy has been determined to seldom exceed 0.05-0.1 meter. If better values have been determined for network accuracy for the area covered by the specific dataset, then those values should be used in place of these general values.

Vertical Accuracy:		-
Average Control Point S	Spacing (ft)	
	meters	feet
1st Order, Class I	0.000	0.000
1st Order, Class II	0.000	0.000
2nd Order, Class I	0.000	0.000
2nd Order, Class II	0.000	0.000
3rd Order	0.000	0.000

Horizontal Accuracy:	= ;:	
Average Line Distance	(ft)	
	meters	feet
1st Order	0.000	0.000
2nd Order, Class I	0.000	0.000
2nd Order, Class II	0.000	0.000
3rd Order, Class I	0.000	0.000
3rd Order, Class II	0.000	0.000